2005 Seney National Wildlife Refuge
Trumpeter Swan Monitoring Project

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Introduction

Trumpeter Swans (*Cygnus buccinator)* originally inhabited a substantial portion of North America until over hunting combined with habitat degradation caused severe population declines and widespread extirpations in the late 1800's (Mitchell 1994). In 1991 Seney National Wildlife Refuge (SNWR) participated in a multi-agency collaborative effort to re-establish this bird species to northern Michigan. Over the period 1991-1993, 44 two-year old birds were released with the expectation that these individuals would breed among the large open pools and associated wetlands present at the Refuge (Corace et al. *In Press*).

Since establishment of a breeding population of Trumpeter Swans at SNWR, the number of birds has dramatically increased and the number of nesting pairs appears to be stabilizing as the population approaches what may be the carrying capacity of the Refuge (Corace et al. *In Press)*. This report is a summary of Trumpeter Swan occupancy and productivity at SNWR for 2005.

Methods

Weekly surveys were made over the three Water Management Units of the Refuge by Applied Conservation Biology Interns, Kim Henslee and Rachel Frame, volunteers Jim and Jodi Patton, Refuge Biologist, Dave Olson, and Refuge Forester, Greg Corace. Surveys began 27 June 2005 and were continued each week until 23 August 2005. During each week, Units 1, 2, and 3 were surveyed on the same day. During each survey, the number of Trumpeter Swan adults/juveniles (i.e., whitebirds) and cygnets were counted as were the number of breeding pairs. Upon completion of the surveys,

final population statistics were compared among years for which the census has been conducted.

Results & Discussion

The number of Trumpeter Swan whitebirds was at a record high in 2005, with 230 whitebirds counted on 9 August and an average of 209 individuals counted over nine weeks. Thirty nests were identified and 110 cygnets were estimated to have hatched from 25 broods (D. McCormick, pers. obs.). However, only 20% (22 individuals) of cygnets fledged. This low survival rate surpasses even the prior poorest cygnet producing year of 1993 when only 24% of the cygnets fledged (Corace et al. *In Press)*.

The decline in cygnet survival rates may be caused by increased predation from snapping turtle (*Cheldyra serpentine)*, northern pike (*Esox lucius)*, mink (*Mustela vison)*, coyote (*Canis latrans)*, gray wolf (*Canis lupis)*, and especially, bald eagle (*Haliaeetus leucocephalus)* (Corace et al. *In Press)*. Moreover, the unusually low water levels that were present throughout the Refuge in 2005 may have exacerbated this problem and made cygnets more vulnerable to predation. For instance pools such as B-1, I-1, and A-2 west which prior to 2005 had successfully produced a combined total of 118 cygnets and had average survival rates ranging from 62-82% failed to produce a single cygnet in 2005.

Another interesting finding from 2005 was the considerable temporal error noted in surveys. For example, on 27 June a total of 24 cygnets were observed. By 13 July, a total of nine cygnets were observed. This number then stabilized at 21-22 cygnets over the last three weeks of the sampling period (Figure 3). Such a high level of error must be

addressed in the future to ascertain the temporal efficiency of the survey methods employed. A slight fluctuation between weeks could be attributed to factors such as weather conditions and observer familiarity with individual broods and pool systems. However, several surveys indicated the absence of multiple broods, sometimes for extended periods of time (Table 2). The ability of a road based survey method to effectively examine all pool systems, many of which are very large and contain narrow projections outside the observer's range of vision, should also be taken into consideration.

As stated previously, water levels were extremely low in 2005 and Trumpeter Swans are known to, "avoid acidic, stagnant, or eutrophic waters and typically require shallow, stable levels of unpolluted fresh water" (Mitchell 1994). Moreover, birds have been documented moving their young up to two kilometers over land or water to reach appropriate resources in times of environmental stress (Lockman et al. 1987). Such was the case for the C-1 brood. The pair was observed in various pools within Unit 1 and was last seen with three well developed cygnets in E-1 Pool, verifying that families often relocate, sometimes multiple times to areas with appropriate resources. Similarly, a brood that hatched from C-3 Pool with five cygnets was not observed in the first six weeks (27 June through 2 August) of this survey. However, a pair with three cygnets was then observed over the last two survey weeks. Other pools within the Refuge (such as C-2 and M-2) also had several consecutive weeks where cygnets were not observed, only to have reappearances later. The tendency to relocate the entire brood over varying distances could partially explain why several families were missing, often for several sequential weeks, from the roadside surveys.

Adult swans typically undergo a complete molt from June-August, rendering them flightless for a small period of time (approximately 30 days) (Mitchell 1994). Although males and females within a pair often complete this molt at slightly different time periods, such vulnerability may cause them to become more reclusive and be more cautious with their offspring. As mentioned previously, an increase in bald eagle predation upon cygnets has been noted in previous years and several eagles were observed on pools that contained swan families at the same time as the survey. It is possible that parents were attempting to obscure cygnets from aerial predators.

Conclusion

Although during 2005 an all time high number of whitebirds and hatched cygnets occurred on the Refuge, it was also a record year for the lowest percentage of cygnets fledged. However, numerous variables such as annual changes in weather and the population of different predators (especially bald eagle numbers) need to be considered when contrasting survival rates of cygnets over time.

A discrepancy in cygnet numbers between weekly surveys was a problem that was encountered through pools in Unit 2 and 3, in particular. An aerial count was proposed to coincide with the last count of this project, but was not completed due to scheduling conflicts. Such a count would have offered sufficient numbers to compare the effectiveness of the traditionally used road system survey with one completed from an airplane with different limitations.

Figure 1. Number of Trumpeter Swan whitebirds, Seney National Wildlife Refuge (1991-2005).

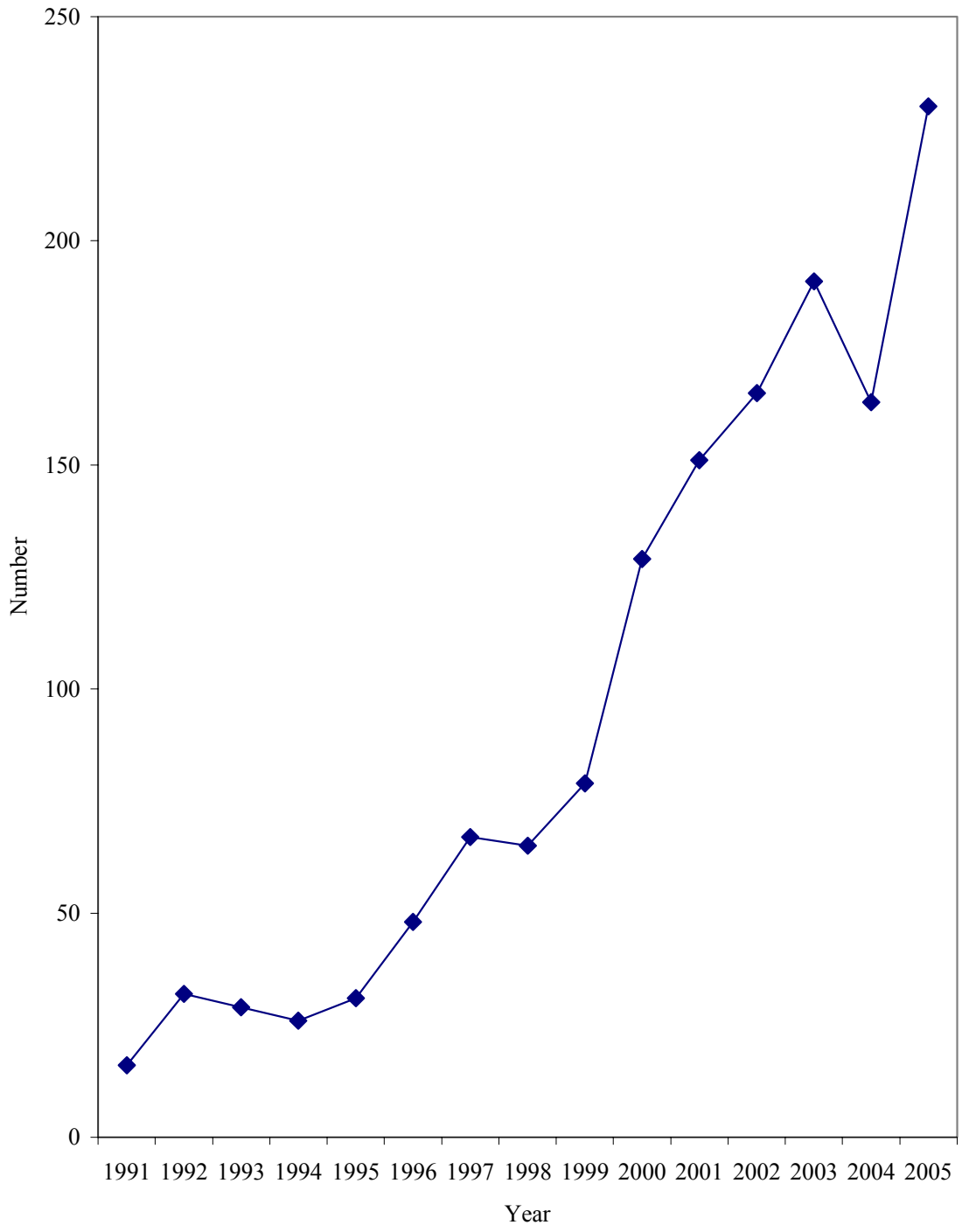

Figure 2. Number of Trumpeter Swan cygnets hatched and fledged, Seney National Wildlife Refuge (1991-2005).

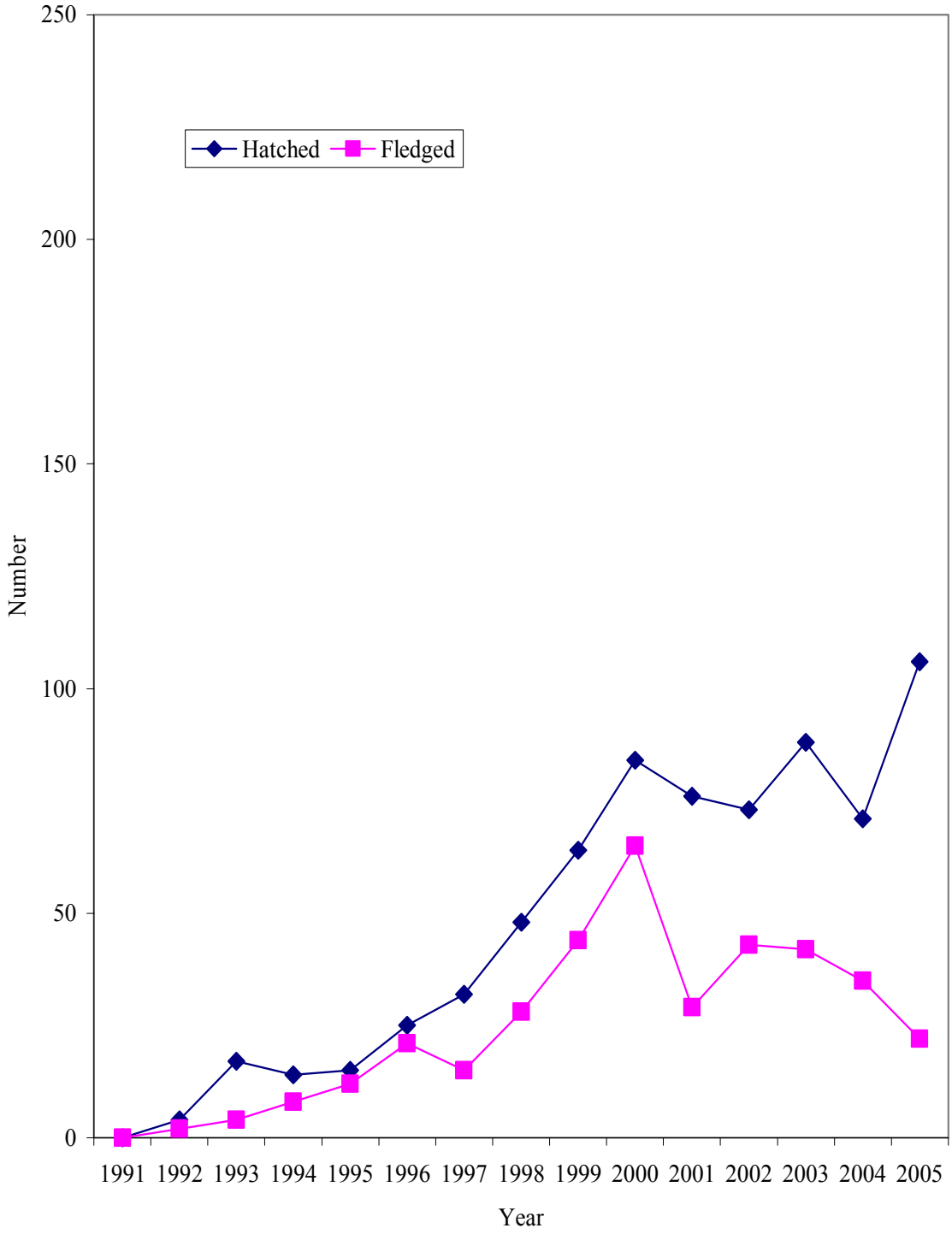

Figure 3. Number of Trumpeter Swans whitebirds and cygnets observed weekly during, Seney National Wildlife Refuge (2005).

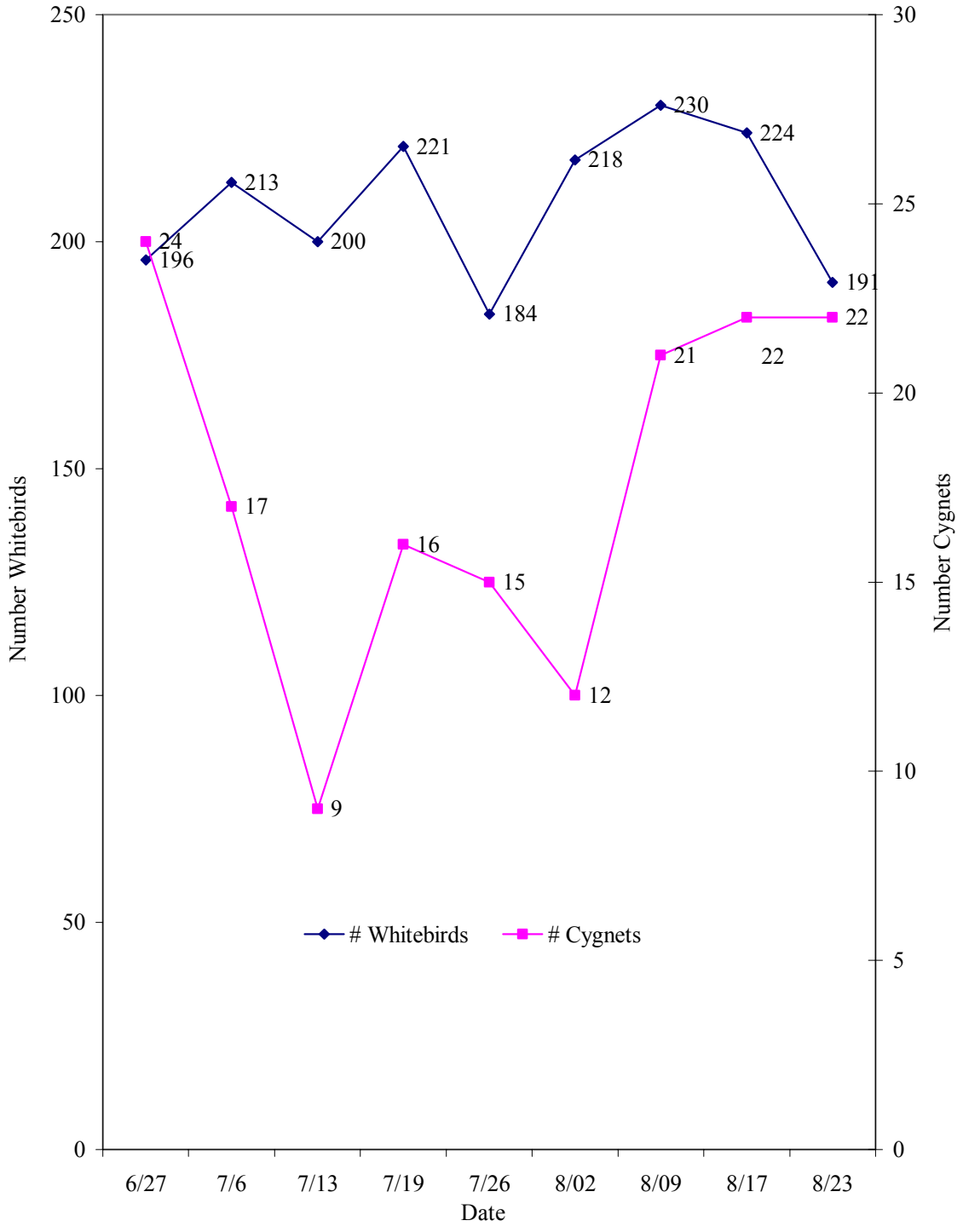

Table 1. Pool-level Trumpeter Swan productivity, Seney National Wildlife Refuge (2005).

Pool	Number of Successful Nests	Number Hatched	Number Fledged	% Survival
A	1	3	0	0
B	2	5	0	0
C	2	11	3	27
D	1	6	0	0
E	2	10	0	0
F	2	8	0	0
G	1	0	0	0
I	1	6	0	0
J	1	1	0	0
Show Pools	1	3	1	33
A-2 West	1	7	0	0
A-2	1	4	4	100
C-2	1	3	2	67
M-2	1	6	1	17
T-2 West	1	4	2	50
C-3	1	5	3	60
Marsh Creek	5	22	6	27
Big Spur	1	6	0	0
Totals:	**25**	**110**	**22**	**20%**

Table 2. Cygnet development compared with dates of observation, Seney National Wildlife Refuge (2005).

Pool	cygnets hatched	Approx. Hatch Date	27-Jun	6-Jul	13-Jul	19-Jul	26-Jul	2-Aug	9-Aug	17-Aug	23-Aug
			3 wks	4 wks	5 wks	6 wks	7 wks	8 wks	9 wks	10 wks	11 wks
C	5	6/06	0	0	0	0	0	0	**3**	**3**	0
E			0	0	0	0	0	0	0	0	**3**
Wildlife Drive Exit			**4**	**4**	**3**	**3**	**3**	**3**	0	0	0
			3 wks	4 wks	5 wks	6 wks	7 wks	8 wks	9 wks	10 wks	11 wks
Show Pools	3	6/10 (1 wk)	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**
				1 wk	2 wks	3 wks	4 wks	5 wks	6 wks	7 wks	8 wks
A2E	4	6/22 (on)	**0**	**4**	**3**	**4**	**0**	**4**	**4**	**4**	**4**
			3 wks	4 wks	5 wks	6 wks	7 wks	8 wks	9 wks	10 wks	11 wks
C2	3	6/06	**3**	**0**	**0**	**0**	**2**	**0**	**3**	**3**	**2**
			3 wks	4 wks	5 wks	6 wks	7 wks	8 wks	9 wks	10 wks	11 wks
M2	6	6/19 (2 wk)	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**1**
			2 wks	3 wks	4 wks	5 wks	6 wks	7 wks	8 wks	9 wks	10 wks
T2W	4	6/20 (1 wk)	**2**	**0**	**0**	**2**	**2**	**2**	**2**	**2**	**2**
			5 wks	6 wks	7 wks	8 wks	9 wks	10 wks	11 wks	12 wks	13 wks
C3	5	5/31	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**3**	**3**
			3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
Marsh Creek	2, 5	6/09, 6/13	**4**	**2**	**0**	**4**	**6**	**2**	**4**	**6**	**6**

Illustrating movement of pair and cygnets

Sequential counts where cygnets not observed

Literature Cited

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